Broader Gulf of Mexico Water Column Study
MC252 Deepwater Horizon Oil Spill

Cruise 3 Plan

Sampling Vessel: M/V *Arctic*
Supply Vessel: M/V *Emily Bordelon*

Acoustic Survey, MIMS, and Water Column Sampling
September 4, 2010

Prepared by: Jodi Harney and Tim Thompson (ENTRIX), Robert Mulcahy (CSA)
Reviewed by: Laura Riege and Bill Graeber (ENTRIX)

Proposed Cruise Dates: September 5, 2010 – September 16, 2010

1.0 Introduction

The Broader Gulf of Mexico (GOM) Water Column Study is a multi-phase effort to characterize the changes in the extent and limits of oil in the water column associated with the MC252 Deepwater Horizon incident (Broader Gulf of Mexico Water Column Study Framework, July 2010). To date, the location of both surface oil slicks and submerged layers of diffuse oil have been tracked by a variety of methods, including visual observation, bundled water quality sensors, water quality sampling, and acoustic imaging. Implementation of this Cruise will develop additional data that are needed to define changes in the extent and concentration of both near-surface and sub-surface oil, dissolved hydrocarbons, and dispersant.

The region of interest in this proposed study includes sampling locations along radial transects in near-field areas (extending from the well site to distances between 2 km and 144 km which were previously sampled in Broader Gulf Cruise 1 and/or Cruise 2) and sampling locations on rectangular grids in far-field areas southwest of the well site (established by Unified Area Command [UAC] and the NOAA Subsurface Monitoring Unit [SMU]) (Figure 1). Some of the locations in the far-field grids were previously sampled by ENTRIX vessels during a cooperative NRDA-Response mission known as "Operation Clean Sweep" (Aug. 17-23, 2010). These data, as well as observations provided by UAC/SMU Mission Guidance, were used to inform the sampling plan proposed in this study.

In conjunction with this study, synoptic surveys will be conducted by five additional ENTRIX vessels working in both near-field and far-field areas. The proposed activities of those five vessels are provided in a separate Cruise Plan. In general, the vessels will be conducting water sampling according to NRDA protocols, consistent with the activities

of previous Broader Gulf Cruises. Applicable protocols are provided as appendices to this plan (e.g. water sampling, sampling handling, naming conventions, COC templates, QA/QC procedures, and NOAA QAP).

In consideration of limited available resources and time, this plan will not substantially evaluate water column conditions in the broad areas north and east of the wellhead, but instead will focus on the ephemeral conditions in the regions where available data indicate hydrocarbons have migrated in surface and subsurface waters. Sampling in areas to north and east of wellhead has been evaluated by previous cruises and these areas may be considered for sampling and other evaluations during the course of future cruises.

1.1 Cruise Objectives

Cruise 3 is a continuation of the Broader GOM Study Plan and builds upon information gained in Cruises 1 and 2. The objectives of Cruise 3 are:

1. Document physical and chemical properties of the water column from the surface to the seafloor (full-depth) to document water quality and to determine temporal and spatial changes in any observed toxic constituents.

2. Augment existing information regarding the location and spatial extent of any oil and/or dissolved hydrocarbons and/or dispersant concentrations in the water column by re-sampling previously sampled locations to provide a time-series of water quality data.

3. Provide empirical data regarding hydrocarbon concentrations in the water column at recurring intervals through time to support development and to constrain future fate and transport modeling.

1.2 Overview of Study Elements

This study will utilize acoustic instruments, oceanographic profiling instruments (CTD/DO/fluorescence), an underwater Membrane Introduction Mass Spectrometer (MIMS), and full-depth water column sampling according to NRDA protocols to document the physical and chemical properties of the water column, information which is fundamental to an understanding of current marine conditions and oil spill effects.

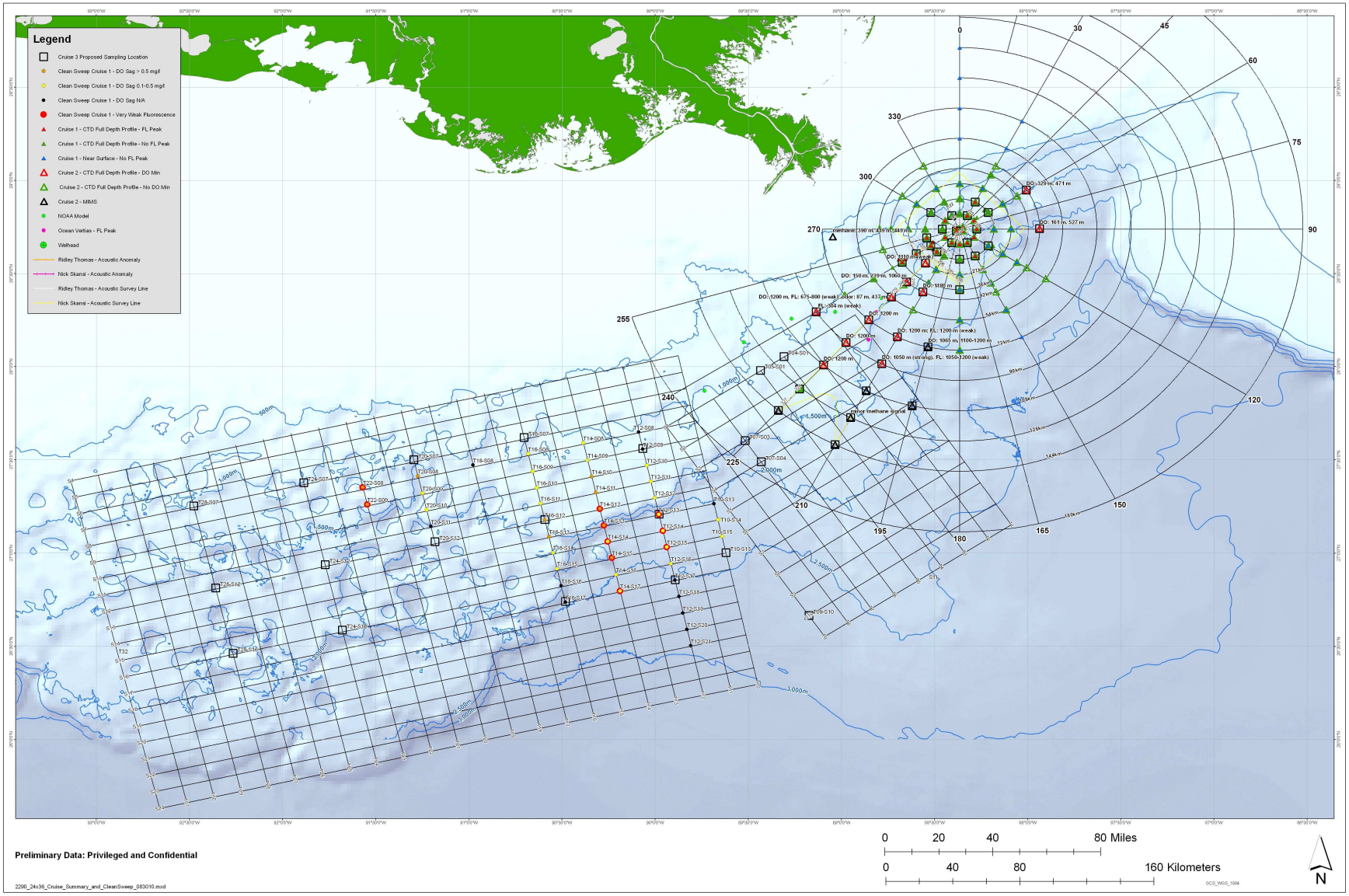

Figure 1. Region of interest and sampling locations on the Broader Gulf radial grid and the UAC/SMU far-field grids. Adaptive sampling may occur west of the transects and stations shown. An 11x17 PDF version of this figure is attached as an appendix.

Specific components of sample and data collection proposed in this research cruise plan include:

1. Acoustic surveying using dual-frequency (38 kHz and 200 kHz) echo sounders to map water column backscatter, stratification, and anomalies potentially related to sub-surface hydrocarbons, oil plumes, and/or methane seeps.
2. Deployment of an underwater Membrane-Introduction Mass Spectrometer (MIMS) instrument to detect and quantify the presence of dissolved gases and volatile organics *in situ*. Distribution of these compounds will be examined spatially as well as vertically (depth profiles) using both vertical cast deployments and deep tows with low-frequency oscillations through the water column.
3. Measurement of Conductivity, Temperature, Depth (CTD), and dissolved oxygen (DO) *in situ* to characterize the physical characteristics and vertical density structure of the water column (e.g. thermoclines and pycnoclines).
4. Measurement of UV fluorescence *in situ* to detect particulate oil (and distinguish signals from chlorophyll a using a sensor packaged with the CTD instrument.
5. Deployment of a water sampling rosette to collect whole water samples for measurement of the following chemicals in accordance with the attached NOAA Analytical Quality Assurance Plan (QAP):
    - Extended PAH (parent plus alkylated PAHs)
    - BTEX
    - TPH
    - VOA, TSS, CHN
    - Dispersant concentrations by LC/MS/MS
    - Methane

A customized towfish platform constructed for this study (Figure 2) enables the packaging of the water sampling rosette with the MIMS, CTD/DO sensor, and fluorometer. The towfish can be deployed in vertical cast mode on fixed sampling locations or in deep-tow mode in areas in which it is operationally safe to do so. USBL calculations will allow for the position of the towfish to be quantitatively known during deep tow operations.

The proposed study will complement acoustic surveying performed in the area to date by revisiting transect lines previously mapped by the R/V *Ridley Thomas* and/or the M/V *Nick Skansi*. Investigation of acoustic anomalies, followed by MIMS deployment and water sampling at the location of anomalies, may also facilitate distinction between natural seeps and the plume from the MC252 incident.

2.0 Methods

2.1 Locations to be Sampled

The region of interest in this proposed study includes sampling locations along radial transects in near-field areas (extending from the well site to distances between 2 km and 144 km which were previously sampled in Broader Gulf Cruise 1 and/or Cruise 2) and sampling locations on rectangular grids in far-field areas southwest of the well site (established by Unified Area Command [UAC] and the NOAA Subsurface Monitoring Unit [SMU]) (Figure 1).

2.2 Acoustic Surveying

In this study, the M/V *Arctic* will map the acoustic properties of the water column to identify density differences and backscatter sources that may represent particulate oil, dispersed hydrocarbons, or methane. The vessel will utilize a Simrad EK60 single-beam echosounder operating at dual frequencies of 38 kHz and 200 kHz. Raw acoustic data will be processed using software from EGSA, C-View, and Simrad to generate a mosaic of backscatter intensity measurements. The backscatter mosaic will be interpreted by geophysicists and technicians on board the vessel to identify acoustic anomalies in the water column. Anomalies may be investigated using full-depth oceanographic sensors (CTD/DO/CDOM fluorescence) and water sampling to characterize the water column in the vicinity of the anomaly. The vessel is also equipped with a suite of instruments on a custom towfish platform to enable synoptic sampling of oceanographic properties, the presence of dissolved gases and volatile organics, and sampling of whole water for chemical analysis (Table 1, Figure 2).

2.3 Membrane Introduction Mass Spectrometry (MIMS) Deployment

In addition to acoustic surveys, the M/V *Arctic* will be equipped with an underwater Membrane Introduction Mass Spectrometer (MIMS) capable of *in-situ* detection and quantification of dissolved gases, volatile organic compounds (VOCs), and low molecular weight hydrocarbons. Introduction of analytes into the mass spectrometer occurs through a high-pressure polydimethlyl siloxane (PDMS) membrane introduction system that has been pressure tested to a depth of 2000 m. The membrane interface used in these systems provides detection at parts per billion (ppb) levels of many VOCs and parts per million (ppm) levels for many dissolved light stable gases (see appendix “SRI International MIMS Description”).

During Broader Gulf Cruise 2, the MIMS system was deployed in cast mode to collect vertical profiles of the water column. In Cruise 3 (this plan), distribution of these compounds in the water column will be examined spatially as well as vertically, using both vertical cast and deep-tow modes. Deep-tow operations will be conducted by raising and lowering the towfish while the vessel is moving at a slow speed (~1.5 knots). Low-

frequency oscillations between depths of 700 m and 1200 m below the sea surface will be targeted. An acoustic survey will be conducted the night before planned deep tow operations to collect bathymetric data in the area, to establish appropriate depth ranges for sampling, and to identify any hazards. Deep tow operations will only be conducted in the absence of vessel traffic, obstacles, and other hazards.

Utilization of the custom towfish as a synoptic instrument platform enables real-time observation and interpretation of CTD, DO, fluorescence (CDOM), and dissolved gases and hydrocarbons. A 12-bottle rosette mounted on the towfish will enable the targeted sampling of water masses on the basis of real-time data provided by the suite of instruments. Water samples will be collected over a range of MIMS hydrocarbon concentrations to compare the *in situ* data to laboratory analyses.

Data to be generated in tab-delimited text format include:

- Location ID (sampling station number according to naming convention)
- Positional data (latitude and longitude)
- MIMS data
- CTD/DO/CDOM data
- Water bottle firing information

Reports from MIMS analyses to be generated in PDF format include:

- Dissolved gas (methane, carbon dioxide, oxygen, and nitrogen) depth profiles
- Benzene, toluene, and xylenes (BTX) depth profiles
- Hydrogen sulfide, alkanes, and naphthalene depth profiles

2.4 Surveying and Sampling Pattern

Acoustic surveys during Broader Gulf Cruises 1 and 2 were conducted by the R/V *Ridley Thomas* and the M/V *Nick Skansi*, beginning 1.5 km from the MC252 well site, and proceeding along counter-clockwise headings to a distance of 24 km from the well site. Survey tracklines appear as concentric boxes around the well head, with 500-meter line spacing near the well (to a distance of 5 km) and 2-kilometer line spacing outward to 24 km (Figure 1). During Cruise 3, only the 22-km transect box will be re-surveyed with acoustic instruments. The strongest and most persistent acoustic anomalies were noted on this transect (also shown in Figure 1) and will be re-sampled.

Some sampling locations on the fixed radial grid in the near-field area will be assigned to the M/V *Arctic*, at which oceanographic profiles, MIMS profiles, and water samples will be collected by deploying the towfish and its suite of instruments either in cast mode or deep tow mode (where operationally feasible). Table 2 lists these sampling locations, including two sites hypothesized to be seeps on the 42 km ring, and several sites sampled by the M/V *Nick Skansi* during Broader Gulf Cruise 2 (using similar equipment).

Acoustic surveying will also be conducted seaward on the 225 transect toward the southwest, continuing into the far-field and intersecting the rectangular grid (Figure 1). It

is anticipated that sonar operations will be conducted at night, and the instrument towfish package will be deployed during the day. In the near-field area, deployment will be in cast mode. Deep-tow operations may be conducted in far-field areas without vessel traffic, during daylight hours, following a night-time acoustic survey of the area.

2.5 Oceanographic Data Collection

Oceanographic instruments on the towfish will collect full-depth profiles to characterize water column properties and stratification from the surface to the seafloor, including *in situ* measurements of:

- Conductivity, temperature, and depth (CTD)
- Dissolved oxygen (DO)
- Fluorescence (crude oil via CDOM and chlorophyll via ECO-FL)
- Turbidity
- pH
- Salinity
- Density

On-board equipment and monitors will convert and display the real-time data, gather and record all raw data, and provide the survey team information relative to the presence of anomalies such as spikes in the DO levels or crude oil levels which will dictate, in part, where and when targeted water column samples will be collected.

2.6 Water Sampling

The decision tree shown in Figure 4 illustrates the water sampling approach employed in this study, in which real-time, *in situ* fluorescence and CTD/DO observations will be used as screening tools to identify the depths at which whole water samples will be collected. The science lead and co-lead will review the data, select the depths for sampling, and Go-Flow bottles on sampling rosettes will be tripped at the appropriate depths by the CTD controller as it returns to the surface. Water samples at the surface-water interface may be collected using the rosette or using a 9-L Nalgene attached to a sampling pole.

The following whole water samples shall be collected at every sampling location (5 or 6 per location):

- at the water surface
- 2 m below the surface
- at the depth of the upper pycnocline (or at 20 m if no pycnocline is observed)
- at the depth of the lower pycnocline (or at 50 m if no pycnocline is observed)
- at 100 m water depth (only if the location was sampled during Cruise 1 according to the near-surface (NS) protocol, in which the base of the profile was sampled at 100 m)

- near the seafloor (as close as operationally safe: within 10 m for vessels with ROV or altimeter; within 20-50 m for vessels lacking these tools)

If either a distinct depth-zone of fluorescence peak is observed and/or a distinct decrease in dissolved oxygen (DO) is observed (relative to background), then whole water samples shall also be collected (3 per location) as follows:

- above the indicator depth zone (fluorescence peak and/or DO minimum)
- at the maximum deflection or mid-point of the indicator depth zone (peak or minimum)
- below the indicator depth zone

Samples collected above and below the indicator shall be collected immediately adjacent to the observed indicator (fluorescence peak or DO minimum) but at a vertical location that is clearly outside the feature (i.e. on the background or ambient trend line of the parameter outside the influence of the perturbation). The actual depths of sample collection are at the discretion of the scientific lead(s) on each vessel based on the real-time assessment of the CTD/DO/CDOM profiles and in accordance with the above criteria. A trend in fluorescence is prioritized over a trend in dissolved oxygen. If both features are observed, only the fluorescence feature will be sampled. The decision tree in Figure 4 illustrates this decision sequence.

In each case, sufficient volumes will be collected to satisfy all analytical procedures in accordance with the NOAA MC252 Analytical QAP V2.1 : Table 1.1a (extended PAH and saturate biomarkers); Table 1.1b (alkane/isoprenoid and TEH); Table 1.1c (volatile aromatic hydrocarbons); Table 1.1d (petroleum biomarkers); and dispersant concentrations.

Water sampling volumes, jar requirements, and handling procedures for each of the primary analytes are summarized in Table 3. Whole water samples for PAH and TPH analyses will be placed in 1-L I-Chem Certified Clean amber glass jars. Whole water samples for total suspended solids (TSS) and organic carbon, hydrogen, and nitrogen (CHN) analyses will be placed in 1-L non-acidified amber glass jars, clearly labeled for this dual intent. The CHN analysis will be conducted after the non-destructive TSS analysis using an elemental analyzer (micro-Dumas method). Organic carbon:nitrogen ratios in seawater typically dominated by biogenic organic matter (e.g., C:N <10) should substantially increase as nitrogenous compounds (e.g., amino acids, proteins, and polypeptides) are diluted by crude oil, which is devoid of such compounds.

To supply ships with the appropriate sample containers, nine (9) water samples are planned for each sampling location. Whole water sample collection, sample bottle labeling, equipment decontamination, and chain of custody procedures will be conducted in accordance with the protocols provided as appendices.

Figure 2. Custom towfish platform which enables simultaneous deployment of the MIMS, CTD/DO, fluorometer, and water sampling rosette.

Table 1. Acoustic / MIMS Equipment aboard the M/V *Arctic*.

Instrument	**Manufacturer**	**Model**	**Frequency**	**Depth Range**
Dual Echo	Simrad	EK60	38/200 kHz	1800 m
Membrane Introduction Mass Spectrometer (MIMS)	Stanford Research Institute	N/A		2000 m
USBL	Sonardyne	7707	19-36 kHz	4000 m

Table 2. Additional equipment aboard the M/V *Arctic*.

Navigation	Veripos and C-Nav GPS, Sonardyne USBLs	-
Winch and armored coaxial cable	0.75” diameter 0.68” diameter	2,900 m in length 3,300 m in length
CTD/DO & Wetlabs CDOM		Water depths to 5,000 m

3.0 Data Management and Trustee Oversight

All profile, acoustic, and other electronic data will be saved to an on-board computer, and all data shall be migrated to a dedicated hard drive. The data will be controlled and managed under project protocols, including Chain-of-Custody tracking of hard-drive. The hard-drive will be duplicated immediately following the cruise, and the original shall be kept in a secure facility.

A NOAA Subsurface Monitoring Unit (SMU) Data Manager on board each vessel will summarize sampling activities and scientific observations throughout the day, populating a spreadsheet template supplied by SMU. The Data Manager will complete the spreadsheet and email it to SMU by midnight, along with the following materials from the ENTRIX Science Lead (provided by 2000 hours):

- daily report (according to the example provided as an attachment to this plan);
- PDFs of each CTD cast conducted that day (according to the example provided as an attachment to this plan); and
- sample list template (according to the example provided as an attachment to this plan).

The data and information contained in the Data Manager's spreadsheet and the science lead's report and cast images will be automatically uploaded into the EPA SCRIBE database. SMU is also coordinating placement of a Trustee on each sampling vessel to provide oversight for the NRDA process.

An internal ENTRIX data management system will be used to store, manage and process data from all study elements. This system will accommodate all chemistry and quality assurance data in formats compatible with BP's centralized database. A data management plan will be prepared to document the systems and procedures that will be used to ensure that data quality and data integrity are maintained throughout data management processes (see MC252 Analytical QAP and Quality Assurance Guidelines appendices).

A variety of data evaluation methods will be applied to summarize and interpret the data to address the objectives of this study. These methods may include, but will not necessarily be limited to:

- Calculation of means and variances of measured parameters to be used for model calibration and validation
- Analysis of variance and F tests of parameters measured at both fixed and adaptive stations, to estimate the variation in measured values that is due solely to temporal changes in conditions at the leading edge of the surface slick or observed surface hydrocarbon layers
- Correlation and regression analyses to evaluate covariance of chemical measurements, and of toxicity results with chemical measurements
- Multivariate methods such as principal components analysis and hierarchical clustering to evaluate the similarity (or conversely, the differences) between different samples or different locations

- Pattern analysis and biomarker interpretation methods to characterize and contrast the hydrocarbon profiles of different samples
- Spatial analyses to evaluate trends in water quality conditions and movements in slicks or observed surface hydrocarbon layers.

4.0 Logistics

4.1 Cruise Schedule

Anticipated mobilization and return dates for the personnel and crew of the M/C *Arctic* is September 3 –14, 2010. The twelve days of ship time includes two partial days of transit time and 10 full days of sampling activities. The tentative schedule will be:

- Day 1: mobilization and departure
- Days 2-11: sampling
- Day 12: return to port

4.2 At-Sea Transfer of Samples

Multiple at-sea transfers of supplies and samples will be necessary to maintain the integrity of the samples and to meet laboratory hold times. Assuming samples have a maximum hold time of seven (7) days from the time of collection, at-sea transfers will be scheduled to occur after two days of sampling. A Chain of Custody (COC) will be maintained. Protocols for at-sea transfers and COC procedures are attached as appendices to this cruise plan. At-sea transfers will be performed by the M/V *Emily Bordelon* (140') operated by Bordelon Marine, Houma, LA.

4.3 Sampling Equipment and Containers

Equipment:
Sampling deployment gear to sample up to 1500 m (5000 ft) (CSA)
Seabird CTD with dissolved oxygen sensor, CDOM sensor, and in situ fluorometer to full depths (CSA)
Go-flow bottle samplers (CSA)
MIMS system (SRI)

Sample Containers (per collection depth):
1-L wide-mouth amber glass jars for unfiltered PAH analysis and unfiltered TSS analysis
1-L polycarbonate (or plastic Nalgene) wide-mouth bottles for dispersant analysis
6-40 ml pre-acidified vials with septa for VOA/BTEX analysis
6-40 ml non-acidified vials with septa for VOA/BTEX analysis
4-15 ml centrifuge tubes for dispersant analysis
Coolers

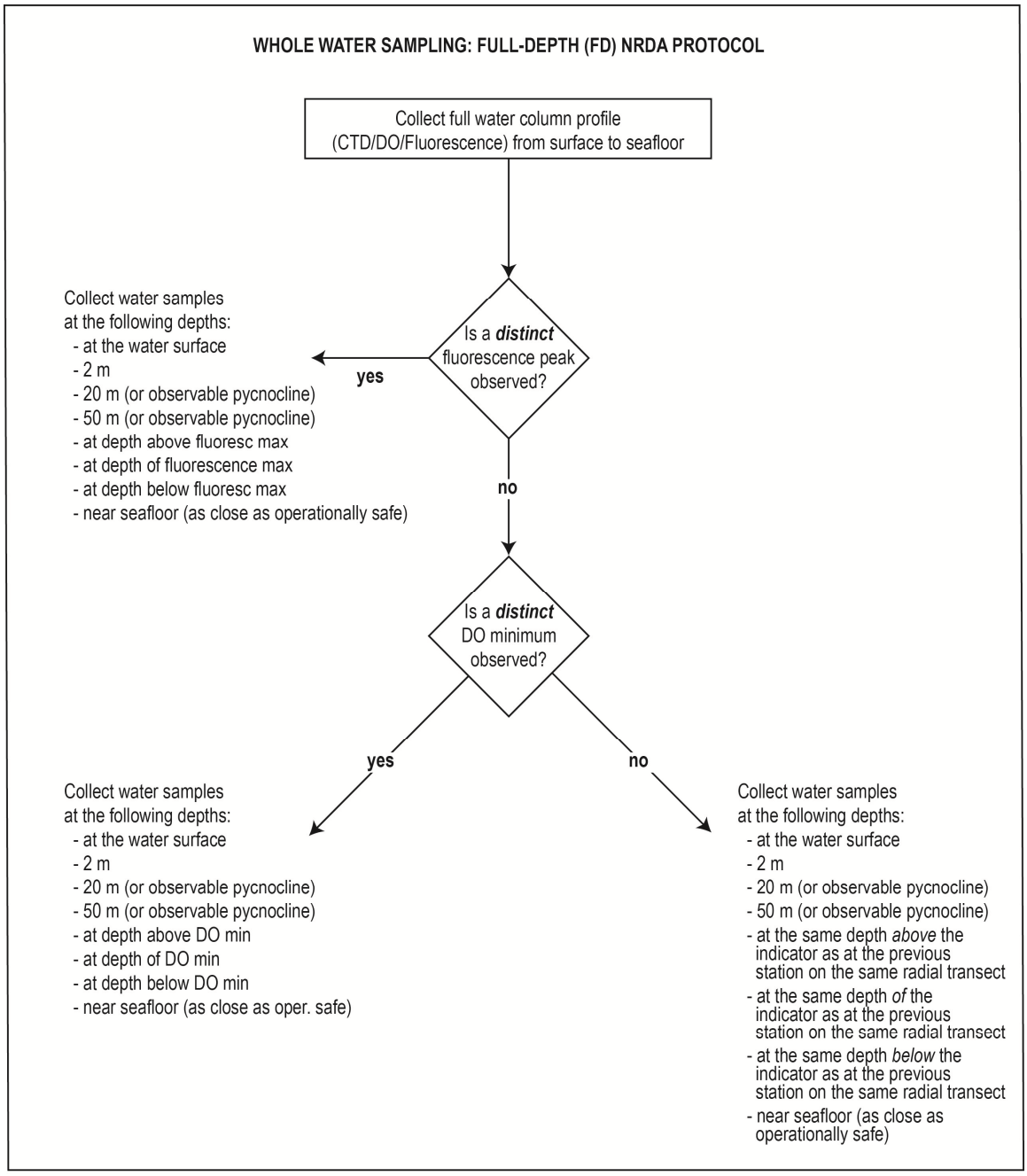

Figure 4. Decision Tree for whole water sample collection at vertical stations in the water column.

Table 3. Summary of water sample volumes, containers, and handling procedures required for primary analytes. Details are provided in the Water Sampling Protocol (appendix).

Analyte	Sample Volume	Sample Container	Sample Handling	Holding Time
PAH (extended) TPH	1 L	Amber Glass, Chem Certified Clean	4° C (refrigerate)	7 days
TSS CHN	1 L	Amber Glass, Chem Certified Clean	4° C (refrigerate)	7 days
Dispersant	4 x 15 mL	Centrifuge tubes	0° C (freeze)	N/A
VOA	240 mL	3 x 40 mL pre-acidified (HCl) vials 3 x 40 mL non-acidified (HCl) vials	4° C (refrigerate)	14 days
Methane	240 mL	3 x 40 mL pre-acidified (HCl) vials 3 x 40 mL non-acidified (HCl) vials	4° C (refrigerate)	14 days

4.4 Personnel

The allocation of personnel is as follows:
3 ENTRIX Personnel
4 SRI Personnel
2 CSA Personnel
7 EGSA Personnel
1 NOAA SMU Data Manager
1 Trustee

4.5 Vessels

All acoustic and sampling operations will be conducted aboard the M/V *Arctic*. At-sea transfers of supplies and samples will be performed by the M/V *Emily Bordelon* (140') operated by Bordelon Marine, Houma, LA.

4.6 Safety Plan

A full operations and safety plan is included in the attached appendix.

4.7 Transfer of the shared electronic media in the onboard equipment to each of the party's hardware for retention and use.

Upon return to port, the vessel Operations Manager shall produce identical copies of the raw and processed electronic media generated during the cruise and deliver one of those copies each to NOAA (or its QA contractor) and to ENTRIX.

4.8 Laboratory information and data sharing

Water samples for PAH, TSS/CHN, VOA, and dispersant analysis will be sent to Columbia Analytical Services (CAS) Labs in Kelso, Washington. Samples for toxicity analysis (M/V *Jack Fitz* and M/V *Rachel Bordelon* only) will be sent to Florida International University (FIU). Samples for methane analysis (M/V *Arctic* only) will be sent to Calscience in Garden Grove, California.

<u>Distribution of Laboratory Results</u>

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LAPD) to the trustee Data Management Team (DMT), the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana and to ENTRIX (on behalf of BP). The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which

is a component of the completed LAPD, will also be delivered to the secure FTP drop box maintained by the trustees' Data Management Team (DMT).

Preliminary data distributed to the DMT shall also be distributed to LOSCO and to ENTRIX. Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Quality Assurance Project Plan, after which time the validated QA/QC'd data shall be made available to all trustees and ENTRIX.

Questions raised on the validated QA/QC results shall be handled per the procedures in the Quality Assurance Project Plan and the issue and results shall be distributed to each party. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC'd data set released by the DMT shall be considered the consensus data set. The LADP shall not be released by the DMT, LOSCO, BP or ENTRIX prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for these data prior to validation/QA/QC, any released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all trustees and ENTRIX.

5.0 Data Management, Evaluation and Analysis

Please refer to the Broader Gulf of Mexico Water Column Study Framework (July 2010) for a description of data management, evaluation, and analysis methods.

6.0 List of Appendices (M/V Arctic)

NRDA (ENTRIX Broader Gulf)
BG Cruise 3 Crew Assignments
BP Response Protocol for Rating Plume Strength based on Fluorescence Signal
Broader Gulf Cruise 3 Data Sheet
CSA NRDA Research Fleet and Equipment
ENTRIX BGOM Daily Cruise Report (DCR) Template
ENTRIX BGOM Daily Operations Checklist
ENTRIX BGOM Decontamination Procedures MC252
ENTRIX BGOM Roles and Responsibilities
ENTRIX BGOM Water Column QAQC Procedures
ENTRIX BGOM Water Column Sample Handling Procedures
ENTRIX BP Deepwater Horizon Heat Stress Acknowledgement
ENTRIX Checklist Electronic Data Transfer at Cruise Completion
ENTRIX COC Ex1 Jack Fitz 21Jul10 24Jul10 CoC Sample Transfer
ENTRIX COC Ex2 Jack Fitz 21Jul10 24Jul10 eCoC Electronic Data Transfer
ENTRIX COC Template
ENTRIX CSA Next of Kin Roster
ENTRIX HSE Plan Broader Gulf NRDA
ENTRIX Sample Label Creation Instructions
ENTRIX Sample Naming Convention
ENTRIX Sample Packing Protocol
ENTRIX SOP for Decontamination Procedures for Field Activities
ENTRIX Tailgate Safety QA Meeting Form MC252
ENTRIX/CSA Protocol for Transfer of Material at Sea
Houma Incident Command PFD Requirements Jul 2010
ICS 213 Deepwater Horizon Heat Stress Management Plan
Material Safety Data Sheets
MC252 Analytical QAP V2.1
MC252 Heat Stress Plan Aug 2010
MC252 Incident Reporting Short Form Rev4
MC252 Incident Reporting Standing Order
MC252 Incident SIMOPS Plan May10 2010 Rev2
MC252 Lightning and Tornado Plan Jun 2010
MC252 Photograph and GPS COC
MC252 Photograph and GPS Data Protocol
MC252 Photograph Descriptions
SRI International MIMS Description

Mississippi Canyon 252 Incident
Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment. Parties each reserve its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

APPROVED:

_____ _____

_____ _____

NOAA Trustee Representative: Date

_____ _____

Responsible Party Representative: Date